Payments for Environmental Services in Indonesia: A Review of Watershed-Related Schemes

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Veröffentlichungsversion / Published Version
Arbeitspapier / working paper

artec Forschungszentrum Nachhaltigkeit

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artec-paper Nr. 186
Dezember 2012

ISSN 1613-4907

Universität Bremen

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Impressum

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Acronyms and abbreviations

artec	Forschungszentrum Nachhaltigkeit/ Research Center for Sustainability Studies
DAC	Development Assistance Committee of the Organisation for Economic Co-operation and Development
DANIDA	Danish International Development Agency
DGIS	Dutch Ministry of Foreign Affairs
EPWS	Equitable Payments for Watershed Services
FAO	Food and Agriculture Organization of the United Nations
FKDC	Cidanau Watershed Communication Forum (*Forum Komunikasi DAS Cidanau*)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (now the Deutsche Gesellschaft für Internationale Zusammenarbeit, GIZ)
HKm	Community Forestry (*Hutan Kemasyarakatan)*
ICRAF	World Agroforestry Centre
IIED	International Institute for Environment and Development
IUCN	International Union for Conservation of Nature
KTI	Krakatau Tirta Industry
LIPI	Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia*)
LP3ES	Institute for Social and Economic Research, Education and Information, Indonesia (*Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial*)
NGO	Non-governmental organization
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
PES	Payments for Environmental Services
PDAM	District Domestic Water Company (*PDAM Perusahaan Daerah Air Minum*)
PJT1	Brantas River Basin Operator (*Perusahaan Umum Jasa Tirta 1*)
PLN	State Electricity Company (*Perusahaan Listrik Negara*)
PWS	Payments for Watershed Services
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (Reducing Emissions from Deforestation and Forest Degradation "plus" conservation, the sustainable management of forests and enhancement of forest carbon stocks)
RUPES	Rewarding Upland Poor for Environmental Services that they provide
SPICE	Science for the Protection of Indonesian Coastal Marine Ecosystems
YPP	Rural Development Foundation (*Yayasan Pengembangan Pedesaan*)

Foreword

This Working Paper is an early output of a research project exploring the potential of Payment for Environmental Services (PES) schemes in coastal and watershed contexts in Indonesia. It is intended to provide a literature-based review of Indonesian PES schemes in watershed contexts, in preparation for a more detailed analysis to be conducted through field visits to selected PES schemes. The research is being conducted under the auspices of the joint German-Indonesian research program *Science for the Protection of Indonesian Coastal Marine Ecosystems* (SPICE) III, Topic 4: *Terrestrial Influences on Mangrove Ecology and Sustainability of their resources (TIMES),* Subproject 8: *Upstream-downstream linkages and new instruments in coastal and watershed governance*.

1. Introduction

Since the mid-1990s, the concept of Payment for Environmental Services (PES) has become increasingly prominent in the environmental policy arena, where it is framed as an innovative way of addressing environmental governance issues (Andersson et al., 2011; Börner et al., 2010; Jack et al., 2008; Laurans et al., 2012; Staton et al., 2010). At their simplest, PES schemes[1] are conceived as ways of incentivizing land and resource use practices which are thought to have positive effects on the environment or, in the current idiom, to provide positive externalities in the form of ecosystem services. Over the past decade, the implementation and analysis of these schemes has increased markedly, especially related to programs in tropical developing countries[2] (Staton et al., 2010, p. 614).

The size of PES schemes in these regions ranges from national level initiatives (for example, in Costa Rica and Mexico) to small pilot projects of less than one hundred hectares. They cover a range of ecosystems and environmental services and they also vary in terms of the involvement of governments in their implementation, the mix of users/ buyers funding the initiatives, and the involvement of intermediary organizations, among others (Wunder et al., 2008). Unsurprisingly, as the number of schemes has increased, heterogeneity in terms of geographical distribution, spatial scale, design elements and types of stakeholders involved has also risen. Given these conditions, it seems fair to characterize PES as a rather diverse and dynamic collection of interventions.

Different drivers have led to the development of PES mechanisms, which is evident from the simple fact that such schemes cover a variety of ecosystems and environmental services – to date primarily water quality and quantity, biodiversity and its benefits, carbon sequestration and storage, and landscape values (Landell-Mills & Porras, 2002; Wunder, 2005). Some schemes are driven by site-specific concerns (for example, improved watershed management), while others are clearly driven by global priorities (for example, biodiversity protection and climate change mitigation). As can be expected, the background for the development of PES schemes covering such a wide range of situations has not been linear or coherent.

PES in Indonesia has been rather slow to develop when compared to, for example, countries in Latin America. Most existing schemes in Indonesia focus on watershed or carbon services and are of a relatively small scale, with uncertain long-term prospects. Existing schemes have primarily been initiated with external support from research organizations, non-governmental organizations (NGOs) and different types of donors. To date a significant portion of academically oriented material on PES in Indonesia has been produced by authors associated with the World Agroforestry Centre (ICRAF) (see, for example, Ajayi et al., 2012; Leimona et al., 2010; Suyanto et al., 2007; Villamor & van Noordwijk, 2011). The International Institute for Environment and Development (IIED), working with the Institute for Social and Economic Research, Education and Information (LP3ES) has also published material on PES in Indonesia (see, for example, Munawir & Vermeulen, 2007), and IIED has published several widely cited documents including information and analysis

[1] The terms schemes, initiatives, mechanisms and programs are used interchangeable in this document to refer to PES interventions.

[2] In this paper the list prepared by the Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development (OECD, 2012) is used to identify "developing" countries. According to notes to the list, "[i]n DAC usage, the term "developing country" employed without qualification has generally been taken to mean a country eligible for ODA [overseas development assistance]."

related to a broad range of PES schemes across countries (see, for example, Bond & Mayers, 2010; Landell-Mills & Porras, 2002; Porras et al., 2008).

While authors associated with these organizations are by no means the only ones to have published about PES in Indonesia, the dominance of these two organizations is likely because they have each had multi-year programs focusing on PES, with components in Indonesia. The ICRAF-led "Rewarding Upland Poor for Environmental Services that they provide" (RUPES) program has been in operation since 2002. It is a multi-country action research program focused on understanding and developing practical environmental service schemes and learning from existing experience (rupes.worldagroforestry.org). In 2001 IIED started a project to explore market-based approaches to the maintenance of watershed services, while supporting local livelihoods. This work evolved into the project, "Developing Markets for Watershed Protection Services and Improved Livelihoods," which also had a multi-country focus.

The first part of this Working Paper (Chapter 2) briefly describes the emergence of PES as a new governance mechanism and explores related debates on definitional issues and on the challenges of demonstrating environmental impacts. The following main part of the paper (Chapter 3) provides a review of experience with PES in watershed settings in Indonesia. The last section (Chapter 4) sums up commonalities of the schemes reviewed and identifies open questions that have not yet been comprehensively discussed in the PES literature to date or seem particularly relevant for our research on PES experiences in Indonesia and their potentials in the context of watershed and coastal governance.

The work presented here is mainly based on a desk study which was supplemented by a limited number of exploratory interviews with stakeholders at the national level in Indonesia in October 2012.

2. Emergence, definitions and impacts of PES

While the term *Payments for Environmental Services* (and related terms like *Payments for Ecosystem Services* or *Watershed Services*) has only come into wide usage over the past two decades, the concept of using market instruments to achieve environmental goals has a longer history, with roots going back to the 1970s, at least (Gómez-Baggethun et al., 2010). Early examples of market instruments used to address environmental problems include agri-environmental payments programs in the United Kingdom and Germany, which were started in the mid-1980s to maintain and enhance biological diversity in agricultural landscapes (Dobbs & Pretty, 2008; Schumacher, 2007) as well as wetland mitigation banking in the United States, which provided a means for compensating for damage to wetlands by purchasing mitigation credits from wetland areas that were restored or established with the intention of providing such mitigation options (Robertson, 2006).

Through the 1990s the concept of ecosystem services was further elaborated (Daily, 1997), with economic valuation of these services coming to the forefront in the mid-1990s (Costanza et al., 1997). Following the publication of the Millennium Ecosystem Assessment, interest in the concept grew significantly, and it gained prominence in policy agendas (Daily et al., 2011).

Within the conservation arena, PES schemes could be viewed as another step in the process of protecting natural spaces and ecosystems. For much of the 20th century the main approach

towards conservation was based on exclusion through, for example, the establishment of protected areas. Starting in the 1980s, in response to criticisms aimed at such excluding approaches, especially in multi-use landscapes in developing countries, the concepts of integrated conservation and development projects and, in particular, community-based conservation, started to gain traction (Swallow et al., 2009). However, the results of these approaches were not always persuasive in conservation terms (Berkes, 2004; Wells & Brandon, 1992). With questioning of these approaches and a general market-friendly mood in policy circles across different sectors, PES emerged as a potential addition to the portfolio of conservation-related governance mechanisms. PES was put forward as a way of generating new funding for conservation (Ferraro, 2001; Ferraro & Kiss, 2002) and improving efficiency in the use of such funds (Engel et al., 2008; Van Hecken & Bastiaensen, 2010). With the inclusion of conservation as an element of REDD+ (Reducing Emissions from Deforestation and Forest Degradation, including the roles of conservation, sustainable management of forests and enhancement of forest carbon stocks) under the global climate change mitigation umbrella, the potential funding and coverage of PES schemes in the conservation portfolio appears set to multiply, especially in relation to carbon storage and sequestration.

2.1 Definitions

This section explores some of the debates that continue to surround the definition of PES. It does so without going into the controversial discussions between proponents and implementers of PES on the one hand and critical scholars rejecting PES schemes and their underlying philosophy on the other. The latter base their critique on the problematic implications the commodification of nature may have for both nature and society, and on concerns that PES may deepen or at least distract from problematic power relations and patterns of resource access and control, while diminishing chances for bottom-up natural resource management (see, for example, Kosoy & Corbera, 2010; McAfee, 2012; Milne & Adams, 2012; Norgaard, 2010). While sharing some of these concerns, we discuss different approaches to defining PES in the following from a pragmatic perspective, simply as a starting point of our open-ended empirical research on PES experiences in Indonesia. Since such programs are currently being implemented in many regions and are in fact being widely promoted by different actors, we think that critical engagement with such processes may deliver useful results of academic and practical relevance.

Within the academic literature, different views have been put forward about how to define PES, and what that means for the efficiency and equity implications of such initiatives. Several authors have noted that a basic divergence appears between definitions that view PES through an environmental economics lens and those that use the perspective of ecological economics (Farley & Costanza, 2010; Fletcher & Breitling, 2012; Gómez-Baggethun et al., 2010; Tacconi, 2012). Fletcher and Breitling (2012, p. 2060) summarize these differences with a favourable view on the latter approach as follows:

> "The environmental economics approach […] prioritizes economic efficiency, and tries to force ecosystem services into the market model. The ecological economics approach […] focuses on the multiple goals of ecological sustainability, just distribution and economic efficiency and favors a variety of payment mechanisms to achieve these goals, both market and non-market. Appropriate institutions and mechanisms are determined by and adapted to the relevant characteristics of the ecosystems and services in question."

The environmental economics approach to PES is captured by the widely used definition put forward by Wunder (2005, p. 3), which describes PES as:

> "1. a *voluntary* transaction where

2. a *well-defined* environmental service (or a land use likely to secure that service)
3. is being "bought" by a (minimum one) environmental service *buyer*
4. from a (minimum one) environmental service *provider*
5. if and only if the environmental service provider secures environmental service provision (*conditionality*)."

It should be noted here that users of this definition readily admit that it does not fully capture the diversity of PES schemes (Wunder et al., 2008, p. 839). As Vatn (2010, p. 1247) explained, Wunder's definition,

> "is more like a theoretical reference point. It does not emphasize the specific problems involved when creating a market for environmental services, specifically how transaction costs influence the format of payments. This does not imply that Wunder is unaware of these issues — he uses much space on discussing them in various papers. They are just not well captured in his definition. Hence it is more about what PES should be according to a certain perspective than what it really is or can be."

In contrast to the definition of PES grounded in the environmental economics perspective, Muradian et al. (2010, p. 1202) aim to develop a "conceptual framework [which] is more sensitive to different sources of complexity embedded in PES". They note that the fact that the widely used prescriptive definition does not capture the characteristics of the majority of existing PES schemes speaks to the limited utility of the approach. Building on a discussion of the complexities and uncertainties related to elements such as markets, ecological systems, distributional implications, social embeddedness, perceptions and power, Muradian et al. (2010, p. 1205) thus propose, "to define PES as a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources".

This definition put forward by Muradian et al. (2010) is not rooted in normative notions of what PES or their outcome should be, but is rather neutral and much more encompassing. It also embraces a broader range of PES initiatives, which the authors suggest can be clustered according to three criteria: i) the importance of the economic incentive, ii) the directness of the transfer, and iii) the degree of commodification of environmental services (Muradian et al., 2010, p. 1205). With this definition and criteria the authors hope that it will be possible to "develop local and regional institutional frameworks that can cope with complexity and diversity, and that can integrate PES within existing regimes of rural development and other policy instruments for environmental protection" (Muradian et al., 2010, p. 1207).

In a continuation of the definitional debate, Tacconi (2012) compared the two approaches above, and put forward an alternate definition. According to this definition, a PES scheme should be viewed as "a transparent system for the additional provision of environmental services through conditional payments to voluntary providers" (Tacconi, 2012, p. 35). This definition expresses clearly the requirement of conditionality which is agreed by other authors as a core criterion of PES (Kroeger, 2012), distinguishing it from various other environmental governance instruments. By characterizing PES as "transparent" systems, involving "voluntary" providers, however, the author brings in new normative notions that seem less helpful for a sober look at PES experiences.

For the purposes of our work, we have therefore chosen to stick with the simple and neutral definition proposed by Muradian et al. (2010), keeping the criterion of conditionality in mind. Over the course of our research, we may come to a more nuanced definition based on our findings regarding the conceptualization, implementation and impacts of PES in Indonesian watersheds.

2.2 Showing environmental impacts

Despite the increasing interest in PES schemes over the past decade, the body of evidence answering the question, "Do PES schemes result in environmental impacts beyond those that would have happened without the schemes?" is drawn from a rather thin representation of relevant studies (Pattanayak et al., 2010). While this is by no means the only important question with respect to PES schemes, it is a critical one. Without assurances that the proposed interventions will result in the desired environmental services, the very premise of the mechanism is undermined, and there is a risk that buyers may be reluctant to engage in such schemes, or, as Kroeger (2012, p. 8) pointed out, "[t]he widespread lack of appropriate service definitions and the resulting inability to demonstrate the absolute and comparative performance of PES programs in both biophysical and monetary terms represents the perhaps most serious challenge to the future of the PES approach."

In addition to the conceptual-theoretical literature (for examples, see Section 2.1), our understanding of the functioning of PES schemes and of their impacts in terms of environmental service delivery tends to come from qualitative case studies, quantitative, often econometric, studies, and meta analyses.

Qualitative case studies often combine document reviews with field work and spatial analysis, in a mixed-method approach. These case studies mainly describe the establishment of PES mechanisms, their modes of operation and the actors involved, sometimes coupled with land use change analyses. See for example, the 14 cases discussed in Wunder (2008), context-rich cases describing the development of Mexico's national PES program (McAfee & Shapiro, 2010) or small-scale PES schemes in Cambodia (Milne & Adams, 2012), and the work of Scullion et al. (2011, pp. 427-428), combining "a time-series analysis of remotely-sensed forest cover change with surveys and field interviews of PES programme participants and informed community members".

Quantitative, often econometric, studies typically attempt to attribute causality to environmental outcomes. Such studies have been conducted at both sub-national and national scales. Much of this literature is related to the PES programs in Costa Rica and Mexico, which is not surprising given the size and duration of these programs. See for example the work of Daniels et al. (2010) (Costa Rica) and Alix-Garcia et al. (2012) (Mexico). The findings of these authors highlight the difficulties in attributing causality with respect to environmental outcomes. In the Costa Rican case, which compared two studies at the national and two at the sub-national level using forest cover as a proxy for forest-based ecosystem services, the findings between the two spatial scales differed. The authors attribute these differences to the framing of the analyses, with the sub-national studies taking into account more details of the PES implementation process and context within which the schemes were established and implemented. In the Mexican case, since forest conservation is a proxy for environmental service delivery, there was no attempt to directly account for impacts on water quality and quantity. The findings showed that while the program had "small to moderate impacts on deforestation between 2003 and 2006" (Alix-Garcia et al., 2012, p. 614), since overall clearing rates were low in any case, the overall impacts of the program were modest.

Meta analyses use statistical techniques to combine findings across multiple studies or cases. For example, Brouwer et al. (2011) conducted a meta-analysis of 47 Payment for Watershed Services (PWS) schemes. Their analysis was designed to identify the institutional-economic factors contributing to the environmental performance of these schemes. The authors noted that empirical

quantitative information on the environmental performance of the schemes was often lacking, and highlighted that this,

> "confirm[ed] the need for establishing quantifiable environmental watershed objectives and monitoring progress towards reaching these objectives. Less than half of the schemes used quantifiable indicators and monitoring the impact of the schemes on environmental performance. In a majority of these cases, the indicators furthermore referred to the efforts put into scheme implementation (such as area with forest cover) instead of the actual impacts and outcomes of the scheme." (Brouwer et al., 2011, pp. 389-390)

In summary, it appears that the different analyses that have been conducted to date show rather modest results with respect to the attributable impacts question posed at the beginning of this section (Pattanayak et al., 2010). In each case there are explanations for uncertain or weak results. They include, among others, i) a paucity of usable data, ii) the early stage of the programs at the time studies were undertaken and the fact that the schemes were still being refined (e.g. Mexico and Costa Rica), and iii) difficulties in separating the influence of the PES schemes from the impacts of pre-existing policies (e.g. Costa Rica). Additionally, according to Pattanayak et al. (2010), the problem of data availability is exacerbated by the fact that programs, including those set up recently, are not designed with evaluation in mind, and practitioners tend to monitor for compliance with program requirements (e.g. number of hectares protected) rather than evaluate actual environmental impacts.

In highlighting the weak state of empirical studies, Pattanayak et al. (2010) note that while it is understandable for empirical work to lag behind theory, in the case of PES the situation is worrying, especially as it seems there is little improvement in sight. Ferraro (2011, p. 1134) goes further, stating that, "greater use of PES is unwarranted unless new or expanded systems are designed explicitly to measure PES's environmental and social effects and to explore competing notions of effective contract design".

On a more positive note, Pattanayak et al. (2010, p. 268) note that this lack of PES evaluation is likely to change, at least with respect to carbon-related PES schemes, with the emergence of REDD. Their optimism

> "stems from three features of REDD. First, it has the clear goal of additionality. Second, large amounts of international resources are being poured into its design and the implementation of pilot initiatives. We are confident that some fraction of those resources will be devoted to monitoring and evaluation. Third, given the advances in science and remote sensing, carbon storage is becoming easier to measure and monitor, especially compared to biodiversity and watershed services."

Notwithstanding the lack of clear evidence about the environmental impacts of PES schemes, it seems important to gain a deeper contextual understanding of the processes leading to adoption of new governance mechanisms, and the implications that such processes have on access and decisions related to natural resources and other livelihood considerations. With Kosoy et al. (2007, p. 454) we believe that "[t]he social embeddedness of markets for environmental services and the social transformation they trigger are very relevant topics for further research".

3. Watershed PES Experience in Indonesia

The policy environment in Indonesia presents no explicit barriers (i.e. prohibition) to the implementation of PES schemes. In fact, there is an emerging policy frameworks supporting PES,

which can be viewed as two processes unfolding in parallel: a more rapidly developing framework supporting payments for carbon services under the auspices of REDD, and a more slowly developing framework flowing from the Environmental Protection and Management Law of 2009 (Republic of Indonesia, 2009), which covers a broader range of environmental services. Since this paper focusses mainly on watershed services, and much has already been written about the REDD+ policy framework in Indonesia (see, for example, Angelsen et al., 2009; Angelsen et al., 2012) we will briefly touch on the less prominent developments under the Environmental Protection and Management Law in the following.

Indonesian Law No. 32/2009 on Environmental Protection and Management makes specific mention of the development of PES mechanisms under Paragraph 8 on environmental economic instruments. The law makes reference to mechanisms of environmental compensation/ exchange between regions, and notes that such mechanisms can be, "adopted by regional people, communities and/ or governments as users of environmental services for providers of environmental services" (Article 43, Paragraph 1c). Its implementation should be supported by issuance of a government regulation on economic instruments (Article 43, Paragraph 4), which would also cover PES. According to interviews conducted in October 2012, the PES component of this regulation would in turn be supported by ministerial guidance in the form of a protocol on PES. It is currently unclear when the regulation on economic instruments will be issued, but it appears that the PES protocol has almost been completed, with dissemination to stakeholders expected to take place before the end of 2012 (interview, October 2012). The protocol shall provide guidance on how to develop PES schemes for the following services: watershed, carbon, biodiversity, scenic beauty.

Whereas the policy framework seems to be rather supportive of PES, or moving in that direction, other institutional factors, and in particular land tenure, could act as serious limiting factors to implementation of such schemes in Indonesia. The vast majority of official forest land (areas which are designated as forest, but may not necessarily be forested) is part of the statutory tenure system, although it may be *de facto* used collectively or by individuals (Angelsen et al., 2012; FAO, 2011). In addition, there are layers of customary rights that are not officially or not fully recognized by the state, and cases of those rights overlapping between groups (for an example from West Kalimantan, see Putra et al., 2008). Even within state forest land there are sometimes overlapping claims to land, with cases of conflicting licenses for areas of land being issued by different parts of government (Mangkusubroto, 2012). While private property is not a necessary prerequisite for a PES scheme, as shown for example by the issuance of contracts to communal land owners in Mexico (Alix-Garcia et al., 2012), lack of control over the asset producing the ecosystem service, typically land and land cover, is a barrier to participation (Wunder & Wertz-Kanounnikoff, 2009, p. 578). For example, land users are less likely to invest in an area of land if their tenure is not secure, and lack of clear tenure can make negotiating contracts difficult (Leimona et al., 2009). In Indonesia, cases of insecure land tenure are abundant, and as such, addressing tenure concerns is likely to remain a top priority if PES schemes are to continue to develop in the country.

Over the last decade a number of academic articles and grey literature sources have examined existing or developing PWS schemes in Indonesia. A scan of the literature in June and August 2012 using different academic and popular, non-academic search engines and including English and Indonesian key words revealed the following schemes in Indonesia that seem to be either in operation, proposed, or have been operational: i. Greater Aceh district and Peusangan watershed, Aceh; ii. Lake Toba, North Sumatra; iii. Sumberjaya, Lampung; iv. Singkarak, West Sumatra; v. Bungo, Jambi; vi. Cidanau, Bantam; vii. Citarum, West Java; viii. Kuningan, West Java; ix. Brantas,

East Java; x. Kapuas Hulu, West Kalimantan; xi. Wain River, East Kalimantan; xii. Malinau and Paser, East Kalimantan; xiii. West Lombok, West Nusa Tenggara. This list is likely not complete; it has simply been used as a starting point for identification of PWS schemes relevant to our research.

Not all of the schemes listed above will be explored in this paper. The schemes described below are those for which there is enough information available from online sources to obtain at least a summary picture of the context, establishment process and implementation mechanism of the scheme. Some schemes are mentioned in documents, but very little additional information is provided. This is in line with the findings of Porras et al. (2008) who found that 37 of the 95 PWS schemes in developing countries that they reviewed could be categorized as preliminary proposals, which had been announced, but for which there was little information. They also noted that of the 41 PWS schemes identified as proposed or ongoing by Landell-Mills and Porras (2002), relatively few were still in progress by the time the 2008 review took place. All this to say that the situation is changing rapidly and information is often limited.

The information presented below is almost exclusively based upon literature sources, with the exception of Kapuas Hulu and some of the background information for the Lombok scheme, which draw on interviews conducted in October 2012. As a result, information is incomplete and some of it may be outdated. In 2013 field visits will be made to update information on a selected number of schemes.

3.1 Lake Toba

According to the literature reviewed to date, the oldest scheme labeled “PES” in Indonesia is in the Lake Toba catchment in Northern Sumatra. It is unclear from available information whether the scheme, which is reported as having started in 1985 (Chandler & Suyanto, 2004), is on-going (IIED watershedmarkets.org, accessed 20 August, 2012). Overall information about the scheme is rather sparse, and most references appear to draw on the same source material. The scheme is an arrangement whereby PT Indonesia Asahan Aluminium makes a contribution to a Nature Conservation Fund for Lake Toba, to be used for the rehabilitation of critical lands in five districts in the Lake Toba catchment (Chandler & Suyanto, 2004). The company generates electricity from the Asahan River to operate its aluminum smelting operations and is therefore interested in sediment reduction. It is not clear how the Nature Conservation Fund distributes the funds, what land use activities are supported, or what the arrangements are with landholders (IIED watershedmarkets.org, accessed 20 August, 2012).

3.2 Sumberjaya – conditional land tenure

In the Sumberjaya sub-district in West Lampung, RUPES and other stakeholders have been involved in at least two innovative environmental services initiatives – one using conditional tenure as an incentive for land use change, and one using payments conditional upon reaching certain levels of sedimentation reduction. RUPES uses the term “rewards” rather than “payments,” to indicate that systems to address environmental externalities can be based on a range of incentives, not just financial payments. This “rewards” approach is at the core of the first of the two schemes.

The 55,000 ha Sumberjaya sub-district, whose boundaries are close to those of the Way Besay watershed, is a mountainous area in West Lampung district (Suyanto, 2007). The watershed experienced a steady decrease in forest area from 1970, when forest cover was 60%, to 2000, when

forest cover was only 12%. Over the same period, the area of coffee increased from 7% of the total land area to 70% (Verbist et al., 2005). Initially the coffee was planted without shade trees, but in the 1980s this started to change and more shade trees were planted, resulting in a certain level of "re-greening." There were multiple drivers of land use change between 1970 and 2000, including increases in global coffee prices in the 1970s and 1980s, in-migration and reductions in transportation costs due to infrastructure improvements (Verbist et al., 2005).

Land tenure in Sumberjaya has been marked by a high level of uncertainty. In 1990 a decade long land classification process was completed for the Sumberjaya watershed (Verbist et al., 2005), which resulted in about 40% of the land being classified as Protection Forest, a category intended to protect watershed functions, 10% as a National Park and the remainder as private land (Pender et al., 2008, p. 75). At around the same time the decision was made to establish a run-of-the-river hydropower plant on the Way Besai River. This led to increasing concerns about the impacts of soil erosion and sedimentation from coffee farms on the operations of the plant. In response to these concerns, in the 1990s there were large evictions from Protection Forest areas, often accompanied by violent confrontations between residents and government officials (Verbist et al., 2005). Tension in the area diffused at the end of the 1990s with the opening of space for dialogue that marked the start of the reform (*reformasi*) period, and moves towards decentralization and changes in approaches to addressing issues of communities reliant on state forest land (Arifin et al., 2009; Verbist et al., 2005).

In 2001 the Indonesian Ministry of Forestry issued a decree on community forestry (*Hutanan Kemasyarakatan* – HKm), which provided the opportunity for farmers' groups to obtain conditional tenure for state protected forest land for an initial period of five years, with a potential extension to 25 years if terms and conditions of the agreements are met. In order to obtain the permits,

> "a group must establish internal regulations to ensure management of the forest area according to prevailing laws; use participatory procedures for decision making, conflict resolution, and organizational management; be recognized by the community through the village administrative head; and prepare a location plan indicating the area to be managed, protection and cultivation blocks, and the period and plan for managing the area." (Pender et al., 2008, p. 2)

According to Arifin (2005), these requirements are quite challenging for groups to fulfill.

Once the permits have been granted, contracts require farmers to grow at least 400 trees per hectare, with at least 30% of the trees being timber species. Farmers do not have the rights to cut and sell the timber trees (Arifin et al., 2009). Conditionality is based on a number of criteria and determines for how long the tenure is extended beyond its initial stage (Suyanto, 2007, p. 33).

In 2004 RUPES became actively involved as an intermediary working to facilitate a scaling up of farmers obtaining HKm permits (Pasha & Leimona, 2011). According to Arifin et al. (2009, p. 2042), "[a]s of 2005, 28% of the protected forest area was managed through HKm contracts, 56% of the area was in process of negotiation for HKm contracts, while the remaining 16% had no community forestry status." In 2006 permits were granted to all outstanding applicants, increasing the area covered to 11,633ha (Kerr et al., 2008). Initially permits were for five years. Pender et al. (2008) reported that subsequently some groups had been granted 25 year permits, but up-to-date information is lacking, as is information about any subsequent permits granted after 2006.

3.3 Sumberjaya – Results-based sedimentation reduction (RiverCare)

From the literature reviewed to date it appears that the results-based sedimentation reduction work of RUPES was conducted in two phases. Information presented here covers the period up to the beginning of 2009. Additional sources of information need to be sought for post-2008 activities and impacts. Despite the pilot nature and small scale of the work, it is interesting to note that it has a special place in the literature on PES as one of the few non-carbon PES schemes which includes results-based conditionality. As noted by Porras et al. (2008, p. 2) in their review of multiple PWS schemes,

> "[b]ecause of the challenges in measuring and attributing changes in the provision of watershed services, all of the ongoing PWS schemes identified follow a land-based approach. Providers of watershed services are paid for changes to their land-management practices that are believed to have a high probability of resulting in the desired impact on watershed services. One exception is the […] [RUPES]-promoted RiverCare scheme in Sumberjaya, Indonesia, which is experimenting with payment according to extent of sediment reduction achieved."

The first phase, conducted in one community in one sub-catchment, was a learning period for both farmers and RUPES (intermediary), and was intended to show the State Electricity Company (PLN), which operates a hydropower plant on the Wey Besey River, that it would be possible to directly contract farmers to reduce sedimentation. Sedimentation reduction activities included construction and maintenance of check dams, terraces and drainage along pathways (Suyanto, 2007, p. 33). In this phase, a "RiverCare" community group was formed to lead in the activities. RUPES acted as a stand in buyer, as well as providing support for strengthening capacity and financing for start-up activities. RiverCare as the seller and RUPES as the buyer, signed a contract which included specific payments for achieved levels of sediment reduction: Reduction of 30% or more - USD1,000; reduction of 20-30% - USD700; reduction of 10-20% - USD500; reduction of less than 10% - USD250 (Suyanto, 2007).

By the completion of the contract at the end of 2007, the level of sedimentation reduction was under 10% due to a landslide in the catchment, something which was out of the hands of the RiverCare group. Based on this level of sedimentation reduction, as per the contract, a payment of USD250 was made (Huang et al., 2009). Based on this experience, PLN was interested enough in the concept to agree to invest in a one year scheme for sedimentation reduction.

Unless otherwise noted, the summary here of the second phase of activities is drawn from the ICRAF working paper by Pasha et al. (2010), which provide details about how the scheme was established and implemented and reflections on the conceptual implications of the experiences. The program was implemented in the sub-village (*dusun*) of Buluh Kapur, which is under the village (*desa*) of Gunung Terang in the sub-catchment of Air Ringkih. This sub catchment has an area of 522 hectares. The program ran from February 2008 until February 2009. Farmers in the village, joined together in a RiverCare goup, were the sellers of the service; the hydropower company under PLN was the buyer; and RUPES acted as intermediary, negotiating with PLN, and helping RiverCare to set up the necessary systems. Negotiations with the company resulted in an agreement the full amount would be paid if the sediment amount was reduced by 30%. The company agreed to provide a lump sum amount to the RiverCare group of Buluh Kapur as operational funding for undertaking the conservation activities to reduce sedimentation. Fifty percent of the funds were provided upon signature of the contract, and 50% after the activity had been running for three months. Conditional payments to the RiverCare group at the end of the project were agreed as follows for different

levels of sedimentation reduction: Reduction of 30% or greater – micro-power unit with a value of Rp20,000,000; reductions between 21% and 29% - Rp7,500,000; reductions between 11% and 20% - Rp5,000,000; reductions between 1% and 10% - Rp2,500,000. The program of the RiverCare group included conservation activities (vegetation, river bank, soil), water monitoring, management of local farmers' groups, and maintenance of interventions undertaken as part of the program. In addition to monitoring sediment reduction levels after rainfall events, the program also monitored the performance of the various activities. Based on an analysis of the water samples, at the end of the program it was determined that the reduction in sedimentation was 20%, meaning that the payment to the RiverCare group would be Rp5,000,000. However, after reviewing the monitoring reports of program implementation, which were positive and reflected a high level of engagement by RiverCare members, the company decided to in any case provide the "top" reward of a micro-power unit.

RUPES also conducted a third related activity in the watershed. The aim of the field experiment "was to assess the feasibility of using auctions in a developing country context and to obtain an understanding of the drivers of farmers' willingness to accept […] compensation for a conservation contract" (Leimona & Jack, 2010, p. 162). The activities were carried out between 2006 and 2008. The auction resulted in 34 participants receiving one-year contracts covering 25 hectares. The soil conservation techniques specified in the contracts comprised soil infiltration pits, vegetation strips and ridging between coffee trees. Two qualitative and two quantitative monitoring activities were carried out over the year. Payments were staged and based on achievement of land-use related activities, with farmers receiving full payment if they achieved 80% of the contracted activities by the end of the contract. At the end of the year, the weakest activity was planting of grass strips; in contrast, some farmers exceeded contractual requirements with respect to sediment pits and ridging (Leimona & Jack, 2010).

3.4 Cidanau

The Cidanau watershed covers 22,620 hectares and spreads across two districts in Banten province on Java. The Cidanau River is the main supplier of water for industrial and domestic use for the city of Cilegon. The watershed has experienced significant degradation over the past two decades, and various efforts to address the situation have brought little relief. Approximately 20% of the catchment, or an area of 4,300 hectares, is categorized as critical land for surface erosion based on national criteria (Munawir & Vermeulen, 2007, p. 24).

In 1998 a group of concerned individuals established the *Forum Komunikasi DAS Cidanau* (FKDC, Cidanau Watershed Communication Forum), which was legally recognized in 2002 through a Governor's decree. The FKDC is a multi-stakeholder entity, including members from upstream and downstream stakeholders representing public, private and civil society interests (IIED, 2005; Leimona et al., 2010; Munawir & Vermeulen, 2007). In 2002 the concept of PES was introduced to the FKDC by several international organizations, following which a representative of a local NGO, Rekonvasi Bhumi, went to Costa Rica to visit a PES project being supported by GTZ (now GIZ). This led to interest in piloting the approach in the Cidanau Watershed (Leimona et al., 2010). The main problems that the scheme aimed at addressing were perceived decreases in total annual debit and dry season flows, sedimentation and eutrophication (Munawir & Vermeulen, 2007, p. 24). PT Krakatau Tirta Industry (KTI) is the primary licensee, extracting water from the watershed for supplying domestic and industrial customers, including a hydropower station and has led, " conservation, weed clearance, dredging and hydrological research programmes over the past 30

years, in partnership with a range of government departments" (Munawir & Vermeulen, 2007, p. 26). The company is also a member of the FKDC.

In 2004 the PES scheme in the Cidanau watershed commenced. The scheme links PT KTI as a buyer to small scale farmers in the upper areas of the watershed as suppliers, through the FKDC. The FKDC acts as an intermediary and has a contractual agreement both with PT KTI on the demand side and with small scale farmer groups on the supply side. The FKDC formed an ad hoc group, including representatives from government, the buyer and sellers to handle details of implementation, including establishment of "an independent, transparent, credible, and accountab[le] environmental services organizer institution" (Budhi et al., 2008).

Micro sites for the scheme were selected by Rekonvasi Bhumi and LP3ES. Selection criteria included:

"1. Categorization of the area as a high contributor of sedimentation from defined critical lands;
2. Residents tend to fell trees at a high rate; and
3. Land at the location belongs to residents and is not far from their housing." (Munawir & Vermeulen, 2007, p. 22)

Without going into too many details (for more information see Leimona et al. (2010) and Munawir and Vermeulen (2007)), at the beginning the PES scheme involved two villages, with a total target of 50 hectares of land planted with 500 trees per hectare. In 2007 two more villages joined the scheme, adding an additional 50 hectares (25 hectares per village) (Leimona et al., 2010). Staged payments were spread out over five years, and payments reduced in cases where farmers did not meet the target planting, cut the trees or did not care for them. Sellers formed two farmers' groups which signed contracts with the FKDC. The Ad Hoc team is responsible for monitoring activities. Information received from an interview with a representative of ICRAF in October 2012 indicated that new contracts have been signed in Cidanau, but no details were available.

3.5 Kapuas Hulu

The basic premise of the envisioned PES scheme in Kapuas Hulu, West Kalimantan is that if erosion, sedimentation and turbidity in the Kapuas River's tributaries and their catchments can be reduced, water quality will be improved, which is of particular interest to the District Water Company (PDAM) based in the city of Putussibau. Plans for the establishment of a PES scheme in Kapuas Hulu have been underway since at least 2006, when a joint program, "Equitable Payments for Watershed Services" (EPWS) was launched by WWF, CARE and IIED. This multi-country program focused on five countries and was initially designed with two phases. The first was an 18 month preparatory phase to develop business cases for PWS schemes. The second phase, planned to last three to four years, was actual implementation of such schemes in target watersheds (WWF, 2006). Funding support was provided by DANIDA and DGIS. In 2008 mention was made of a third phase (Tresiera, 2008). In this document, the second phase was described as involving activities aiming at land-use changes in selected communities, accompanied by close monitoring of impacts on water quality and livelihoods. Implementation of PWS schemes was expected by the end of 2011. The third phase would start after this, and, "would tentatively start with buyers and sellers of watershed services establishing legally binding contractual agreements." (Tresiera, 2008).

It is currently unclear what preparations were undertaken in Kapuas Hulu prior to the start of the EPWS program. During the first phase of EPWS, which is reported to have run in Kapuas Hulu until 2009 (interview, October 2012), a rapid hydrological assessment was conducted of the Kapuas Hulu basin. This study, "revealed [that] there are early signs of watershed degradation, such as erosion

and sedimentation in the river" (Lusiana et al., 2008, p. 51), and while cautioning that PWS schemes would likely not address all the issues leading to this situation, it was noted that such an approach could play a role as one among a broader range of interventions. In addition to the hydrological assessment, other studies were undertaken looking at community livelihoods, and the policy and legal context. An economic analysis focusing on cost and benefit assessment was also conducted (Putra et al., 2008).

In the second phase, the program focused on the Mendalam River, a tributary of the Kapuas River. A variety of activities are reported to have been implemented, including restoration of approximately 212 hectares of riparian land in five villages along the river, community capacity development activities and monitoring of impacts (WWF, 2012). Following the restoration of the riparian areas, an external evaluation of impacts was conducted by LIPI (the Indonesian Institute of Sciences) and ICRAF. The report is expected to be ready towards the end of 2012, and initial findings seem to indicate that the activities led to a reduction of riverine sediment transport (interview, October 2012).

As of this writing it seems that the program in Kapuas Hulu is somewhere near the end of phase two as mentioned by Tresiera (2008). On the basis of the findings of the independent evaluation, the plan is to develop a relationship with PDAM in support of PWS. Before this can proceed, however, it is first necessary to convince PDAM that it is possible to reduce sedimentation. The agreement with PDAM will, among other things, need to take into consideration the willingness of PDAM's customers to pay for these watershed services. There is also interest in replicating the approach in the Sibau sub-watershed.

3.6 Citarum

There is relatively little information available on the pilot PES scheme in a sub-watershed of the Citarum watershed in West Java. The scheme was initiated with a grant from the Asian Development Bank to LP3ES in 2009, based on an inception report prepared in 2008 (ADB, 2009). One of the justifications for having the pilot in the Citarum watershed was the fact that the ADB had an on-going program in the watershed. The ADB web site explains that the grant for the pilot and demonstration activity is to

> "help develop and demonstrate the use of a compensation mechanism for watershed protection services in Citarum. One of its expected outcomes is the formulation of a policy on payment for environmental services. Recommendations to emerge from this [pilot and demonstration activity] will be considered in the on-going preparation of ADB's Integrated Citarum Water Resources Management Project." (ADB, 2009)

The Integrated Citarum Water Resources Management Investment Program – Project 1, is a large program in the watershed, comprised of loan, technical assistance and grant funding from a variety of sources. It includes a component on "assessment of the potential for development of mechanisms for payment for environmental services (PES)" (ADB, 2012).

The pilot project seems to have been implemented over the period of a year between 2009 and 2010. Two contracts were signed, one of them between PT Aetra and a farmers' group in the village of Sunten Jaya for an area of 22 hectares. PT Aetra provides water for industrial, business and residential areas of East Jakarta and some parts of North and Central Jakarta (PT Aetra, 2012). A second agreement was signed between an entity of the Ministry of Forestry (*Kepala Pusat Standardisasi dan Lingkungan Departmen Kehutanan*) and a local NGO, Yayasan Peduli Citarum, for

activities of a farmers' group in the village of Cikole, covering an area of 33 hectares ("Mid-Term Progress Report," 2009; Pirard & Billé, 2010). In both sites the contracts were for multi-strata agroforestry activities.

Selection criteria for the sites are reported as having included:

1. Residents of the areas that are the source of water are willing to cooperate to protect the area and participate in rehabilitation activities;
2. Areas with a slope of between 20-40%;
3. Critical land with the risk of landslides;
4. Clear land ownership by farmers;
5. Farmers are willing to organize themselves into groups and be actively involved as suppliers of environmental services as part of a PES mechanism (Cita-Citarum, 2011, p. 5).

None of the material reviewed to date indicates the presence of a solid intermediary organization specifically dealing with the PES transactions, although the project's mid-term report does reference a working group which seems to be an embryonic attempt to form an intermediary organization.

The draft contracts provided in the mid-term report covered six to twelve months. This short duration was confirmed by Pirard and Billé (2010). However, in an interview with a representative of LP3ES in October 2012 it was mentioned that the project was still running, with contracts with two farmers' groups for the period 2009-2014.

3.7 Brantas

The Brantas catchment, with a size of 1.2 million hectares, was one of the two Indonesia pilot sites of the three-year IIED project, "Developing Markets for Watershed Protection Services and Improved Livelihoods." In Indonesia, IIED collaborated with the Indonesian NGO LP3ES. The project played an instrumental role in the establishment of a small pilot PWS scheme in two micro sites. This built on the existing interest of the Brantas River Basin Operator (Perusahaan Umum Jasa Tirta 1, PJT1) which, "sees upstream land management as an alternative to downstream dredging and cleaning operations in maintaining water supplies for hydroelectricity and other uses" (Munawir & Vermeulen, 2007, p. 2). Previously PJT1 had transferred its conservation budget to district forest offices for tree planting activities. So investing in the pilot PWS scheme, albeit at an extremely small scale, was a logical move for the parastatal corporation.

LP3ES and a local NGO, Yayasan Pengembangan Pedesaan (Rural Development Foundation, YPP), acted as intermediaries for the scheme, with payments running through YPP. Two farmers' groups in two villages were involved. Sellers included small scale farmers with private land plots of between 0.1 and 0.25 hectares on critical land. A total of 40 hectares was covered. Two-year contracts, with the option of renewal, were signed in 2004 and 2005. Contracts required farmers to plant trees in agroforestry systems and to put in place high quality terracing, with payments being conditional upon meeting the terms of the contract. The buyer in this case was PJT1, who also played a role in site selection, focusing on areas which were considered to play the greatest role in downstream sedimentation (Munawir & Vermeulen, 2007). A third micro-site of 11 hectares was included in the second year of the project after potential participants approached the intermediaries and asked to be included.

By the end of the project, PJT1 was satisfied with the results of the work done by YPP and the farmers' groups and, "indicated that it is willing to consider scaling up to incorporate all land in the critical category that is under private ownership" (Munawir & Vermeulen, 2007, p. 35). However, significant concerns remained about the potential to scale up the PWS scheme to a level where it would truly make a difference at a watershed scale. This is where PJT1's interest lies – the company needs to see proof that the investment in upstream land use change would bring tangible results in downstream sedimentation reductions. It is a challenging situation, as the "pilot schemes would need to demonstrate real savings in dam and waterway maintenance costs at the local level for PJT1 to commit to scaling the scheme up to the whole watershed" (Munawir & Vermeulen, 2007, p. 36).

Following the completion of the IIED/ LP3ES work, in seemingly unrelated discussions, there continued to be strong interest in the potential of PWS in the watershed. Indeed, it appears that the potential of developing a provincial regulation on compensation for environmental services between upstream and downstream stakeholders was under discussion in 2007, although by 2010 it had not yet been realized (Widianto et al., 2010). During interviews conducted in October 2012, it was clarified that the regulation had failed to pass parliament, and that the pilot PWS scheme had faded off following completion of the project.

3.8 Lombok

From the literature reviewed to date it appears that a PWS scheme in Lombok has been approximately a decade in the making, and is likely not fully functional as of this writing (November 2012). The process of establishing the scheme seems to have been marked by interest from different external players over time, and waxing and waning progress at the local level. The discussion appears to have been an important part of deliberations of how to deal with water management in Mataram and West Lombok district, and addressing conflicts between upstream and downstream stakeholders. Significantly, and in contrast to other PWS schemes that have been reviewed in Indonesia, this scheme appears designed to be mobilized "at scale," generating resources that could make a meaningful and lasting difference to land use practices in the target area.

Discussions about the potential for a PWS scheme in West Lombok and Mataram were apparently driven by the results of findings from at least two significant water-related initiatives in the early 2000s. In 2001, World Neighbors, together with a number of local organizations, developed a concept to undertake participatory research in order to better understand natural resource management issues in the Rinjani Conservation area. This obtained support from the local government and financial input from external sources. The results of the research provided a much deeper understanding of the natural resource issues and conflict points in the area. Water and forestry management problems were prominent among these (Astawa, 2004).

In 2002 and 2003, WWF, working with local NGOs such as KONSEPSI, government departments and a university, conducted an economic valuation of the water resources of the Rinjani catchment. They also conducted a study on water customers' willingness to pay (Prasetyo et al., 2009). This information was then used as a basis for designing the scheme and for awareness raising and consultation meetings in the period up to 2004. By 2005 the scheme was ready to collect fees on a voluntary basis from users in Mataram, using collectors from each area of the city (*kelurahan*). However, this system did not work well as, among others things, the costs of collection were high. At that time, both WWF and LP3ES were involved in the scheme, but after a change in focus from a

voluntary scheme to one which would give a mandate to the scheme to systematically collect fees from all customers through the district water company, LP3ES decided to withdraw (interview, October 2012). In perhaps a reflection of the challenges of developing such a system and the negotiations involved, it is interesting to note the observations of IIED and LP3ES as they were developing their pilot projects for Indonesia under the "Developing Markets for Watershed Protection Services and Improved Livelihoods" project. Initially the Segara River basin in West Lombok district was being considered for one of their potential PES pilot sites (Munawir et al., 2003). However, in the 2005 workplan, the decision was made not to continue in Lombok as, "the potential buyer, PDAM, has stalled negotiations" (IIED, 2005).

Following the failed attempt with voluntary collection of fees, a process was initiated to develop legislation supporting the scheme. In 2007 a district regulation (*peraturan daerah*) on the management of environmental services was issued (District of West Lombok, 2007). The focus of the regulation was on using PES to support conservation activities and the provision of development opportunities for residents near areas generating the services. Environmental services subject to direct use included above and below ground water that was commercialized; indirect services included different types of forest areas. Both individuals and legal entities which use the services would be subject to payments. In support of the scheme, a multi-stakeholder institution was to be established as a partner to government. The institution would be a forum including interests from relevant government departments, the private sector, local communities, NGOs, academia, and customers of PDAM.

On the financial side, the regulation stated that income from the payments would be part of the district revenue. As an aside, apparently in the process of drafting the regulation, the Indonesian Ministry of Finance provided advice, and this element, where funds first went into a district account before being transferred into an account for the PES activities, could not be avoided (interview, October 2012). Payments were added to the water bills of PDAM customers. The regulation also provided guidance on the division of revenue, with 75% to be used for environmental service management activities, and 25% for the local government (in this case, according to an interview in October 2012, for use by the Forestry Service for forest restoration, although this is not specified in the regulation). The issuance of the regulation was followed by the signing in 2009 of an MoU between the District Head of West Lombok and PDAM Menang-Mataram about PES (Setiawan et al., 2010). It appears, however, that acceptance of the fee was not universal amid complaints from some customers, and implementation of the system has not necessarily been smooth (2011).

On the demand side it seems the system was better developed than on the supply side. Based on interviews in 2010, Pirard (2012, p. 26) noted that collection of money from customers of PDAM started in late 2009, but that "no PES-like contract has yet been finalised, reportedly because of a lack of capacities and the necessary human resources to negotiate and put the contracts in writing, rather than a lack of motivation and willingness from service providers". Communication in October 2012 indicated that contracts had by then been signed with suppliers, but it is unclear what the time frame is for the contracts and whether they include conditionality clauses, as one would expect to see under a fully operational PES scheme. It is also unclear how the other elements of the system are working, and in particular the flow of funds from Mataram city to West Lombok and the status of the government regulation (interviews, October 2012).

4. Summary and open questions

While it is difficult to draw firm conclusions based on the first review conducted to date, it is nevertheless interesting to look for commonalities and differences related to various aspects of the schemes presented above. The following summary focuses mainly on the schemes in Sumberjaya, Cidanau, Kapuas Hulu, Citarum, Brantas, and Lombok simply because of the lack of information available on the Lake Toba case.

With the exception of the Sumberjaya conditional land tenure scheme, each of the schemes is of a relatively small scale. In terms of geographical location, three of the schemes are found in Sumatra, three in Java, one in Kalimantan, and one in Lombok. Temporally, there seems to have been a period of interest in piloting the PES concept in the early to mid-2000s, with schemes being initiated in Sumberjaya, Cidanau, Brantas, and Lombok. The schemes in Kapuas Hulu and Citarum were initiated in the mid- to late 2000s. It will be interesting to follow developments and to see whether new initiatives will come on line following these.

It appears that three external facilitators (see Section 4.2) have played a pivotal role in advancing the PES concept at the field level in Indonesia, and perhaps also at the national policy level, since policy development, and in particular the draft PES protocol mentioned in Section 3, has drawn heavily on existing field experience. With the exception of the Lake Toba scheme, one of three organizations – LP3ES, ICRAF and WWF – has played pivotal roles in each of the schemes. LP3ES played a central role in the Cidanau, Citarum and Brantas schemes, ICRAF in the two Sumberjaya schemes, and WWF in the schemes in Kapuas Hulu and Lombok. Also, these organizations seem to have collaborated at different times in different manners, whether in terms of contributing to policy development or providing support to the individual schemes.

External project funding was also important to the initiation of almost all the schemes, with perhaps the exception of the Lake Toba scheme, although there is little information available on that case. There are indications that the schemes in Sumberjaya, Cidanau and Lombok are now at a stage where they may continue without external funding support. With respect to the Sumberjaya RiverCare scheme and the scheme in Cidanau, it appears that recently buyers signed contracts with new suppliers, although this remains to be confirmed. In Lombok it seems that the scheme is continuing to move ahead, although indications are that it is still not fully operational and continues to face challenges.

It seems that government actors played a rather prominent role in each of the schemes, particularly if one considers parastatal companies. In the Sumberjaya conditional land tenure scheme, activities were conducted on state land, with the Ministry of Forestry effectively acting as a beneficiary of the services, providing conditional land tenure as a reward to suppliers for specific land use actions. In Lombok and Kapuas Hulu, the district water companies represent water users as the beneficiaries in the schemes. In the Sumberjaya RiverCare scheme, a subsidiary of the state electricity company is the beneficiary. Government actors play an important role as members of the intermediary organization in Cidanau and are also involved in Citarum. In Brantas, a parastatal company was the service buyer.

Each of the schemes reviewed fits within the definition of PES adopted in this paper (Muradian et al. 2010, see Section 2.1). The schemes do, however, differ in terms of the three criteria suggested by these authors. With respect to the first criterion, the importance of the economic incentive (or in

the case of the Sumberjaya conditional land tenure case, the *reward* incentive), based on limited information, it seems that in each case the incentive was relatively important in triggering the desired land use change. In terms of the second criterion, the directness of the transfer, in each case, with the exception of the conditional land tenure scheme and the Citarum scheme, payments were transferred (or in the case of Kapuas Hulu, are planned to be transferred) through at least one intermediary. In the case of Lombok, there are two steps between beneficiaries and providers, with funds first being collected by PDAM on behalf of the beneficiaries before being transferred to the multi-stakeholder institution that manages interactions with environmental service providers. Under the Kapuas Hulu scheme, funds will be collected by PDAM, and it is currently unclear whether there will be a separate intermediary managing distribution of funds to environmental service providers. In Citarum, perhaps since the scheme was relatively new, no intermediary was yet in place based on the information used in this review. In the conditional land tenure case, individual farmers are represented by farmers' groups which were granted conditional tenure.

Muradian et al. (2010, p. 1206) defined the third criterion, the degree of commodification of environmental services as, "the extent and clarity with which compensation received by the environmental service providers has been defined as a tradable commodity". In each of the cases reviewed, with the exception of Sumberjaya RiverCare where payments were linked to sedimentation reduction, the situation resembles that described by Muradian et al. (2010, p. 1206) whereby, "the characterization of the commodity is fuzzy, based on inputs and assumptions (shared beliefs) about the relationship between land use and the provision of ecosystem services".

The following sections briefly touch upon some open questions that have been identified through the course of the literature reviewed to date. They are not intended as a comprehensive analysis, but rather serve to highlight some issues that seem relevant to the research project of which this paper is an early part.

4.1 Integration of PES with broader land use and coastal planning

The literature reviewed so far does not provide much information on how PES is integrated into broader watershed or spatial planning processes. Having said that, integration is in some situations implicit through, for example, targeting of critical areas. However, this is not always the case. Understanding how the schemes are integrated into broader processes may also be a matter of scale. For example, the selection criteria for national-level schemes show indications of being more diffuse (covering more services, for example, Costa Rica), or coarser (for example, early iterations of Mexico's scheme) when compared to local schemes, as evidenced by the Pimampiro scheme in Ecuador (Wunder et al., 2008) or the Cidanau watershed in Indonesia (Leimona et al., 2010). Additionally, as is the case in Indonesia, the implementation of PES in many contexts is still in the early, mainly pilot stages, so it may therefore be understandable that there has been little empirical work looking at how these schemes fit into broader processes. It would be useful, however, to keep this in mind as policy processes unfold, and new schemes come on line. With respect to PWS, Bond and Mayers (2010, p. 88) see them as "a tool that will fail, or become irrelevant, if not integrated with wider regulatory approaches, broader watershed management efforts, and explicit attention to governance influences that shape what is possible". It can be expected that we will see more consideration of how PES schemes fit into broader spatial planning processes in the case of schemes linked to REDD+ simply because the emerging REDD+ architecture focuses heavily on national level emissions reductions, with sub-national implementation.

PES in coastal and marine environments are likely to prove more complicated to design and implement than terrestrial schemes due in part to the basic fact that, "[t]he location of [coastal and marine ecosystems] in the land-sea interface […] leads to a high degree of interconnectedness […] across these systems and their services, which may considerably enhance the ecosystem service provided by one single habitat" (Barbier, 2012, p. 12). There is also much less scientific understanding of the ecosystem services of these ecosystems when compared to the terrestrial realm. In addition, resource tenure may tend to be even more diffuse and problematic in coastal areas than it already is in many terrestrial areas of Indonesia (see Section 4.4). Given the fact that there are few examples of operational PES schemes in coastal and marine ecosystems, it is not surprising that the literature on the link between these types of schemes and broader watershed management is thin.

4.2 Role of intermediaries and facilitators

Facilitators of PES schemes are defined here as organizations external to the architecture of the PES scheme which nevertheless play a central role in the design of the system and may provide on-going support during some parts of implementation. In the Indonesia case, using this definition, ICRAF, LP3ES and WWF would be considered as *facilitators*. Intermediaries in the context of PES can be defined as, "the agents mediating transfer of resources between users and providers" (Kosoy et al., 2007, p. 447). They often play a central role in the design and implementation of PES schemes, as highlighted by the findings of Bond and Mayers (2010, p. 57) that within their sample of local PWS initiatives, approximately three quarters of payments to farmers went through intermediaries. There are a range of organizations that play the role of intermediary under different circumstances. In a study of 47 PWS schemes worldwide, Brouwer et al. (2011, p. 389) found that, "[m]ost intermediaries in the schemes were national government (41%) or local NGOs (33%). Other intermediaries included local municipalities (11%) and international donors (6%)."

The role of intermediaries can vary between schemes, with common functional responsibilities cited as being:

"- Scientific advice to project developers, particularly regarding the identification of expected downstream services;
- Design of payment mechanisms, feasibility studies, management plans and monitoring systems;
- Facilitation of negotiations among all stakeholders;
- Land management capacity-building;
- Collection of hydrological data;
- Contract administration, allocation of funds and payments; and
- Provision of buying and selling services as an intermediary". (Greiber, 2009, pp. 8-9)

Several authors have noted that intermediaries also have a role in determining the prices of services and can be important in reducing the transaction costs of the schemes (Bond & Mayers, 2010; Vatn, 2010).

Given the central role of intermediaries in many schemes, a number of authors have noted that these actors can have significant power to shape the scheme, and in fact are often the dominant agent (Leimona et al., 2010; Muradian et al., 2010; Vatn, 2010). The PES literature tends to describe the role of facilitators and intermediaries in different schemes, but there is less analysis of the implications of that role. As a very simple example of these implications, in a discussion of PES schemes in Indonesia, Pirard and Billé (2010, p. 9) noted that among a number of schemes reviewed in Indonesia the schemes in Cidanau and Citarum were similar, which they said can in part be

explained by the, “presence of the same facilitator”. As Pascual et al. (2010, p. 1242) note, “intermediaries (NGOs for example) often have a particular agenda, normally linked to international cooperation agencies, which increasingly are important players in the implementation of PES in developing countries”. Given the critical role of facilitators and intermediaries, the different agendas they can bring to schemes, and the fact that their role “in shaping the performance of PES has been rather neglected in the literature” (Pascual et al., 2010, p. 1242), Muradian et al. (2010, p. 1205) note that, “to analyze the power of intermediary agents to steer the transfer of resources between buyers and providers is then an important subject for research which has not yet been sufficiently addressed in the literature”.

4.3 Gender

Across the literature reviewed to date, including material focusing on equity, poverty and livelihoods, there is very little focus on the gender implications of PES schemes. It seems that this is not because there are no impacts, but rather that the connections are under-researched. Confirming this view, Porras et al. (2008) have observed that “there has been very little attempt to assess the impact of PES initiatives on women or the extent to which they are represented as suppliers”. This could be an area for research, especially in PES schemes that have been operational for some time. Separately, any new research undertaken could seek ways to adequately reflect gender considerations in the research design.

4.4 Tenure

While the importance of tenure issues in the conceptualization of PES is quite central in the PES literature (as briefly discussed in Chapter 3 of this paper), empirical research focusing explicitly on the implications of different tenure arrangements and related conflicts on decisions taken related to the selection of sites for implementation of PES schemes, and the design and operation of the schemes, seems to be lacking in the Indonesian case, with the notable exception of the Sumberjaya scheme in Lampung. This does not necessarily mean that tenure was not the subject of deliberations when the schemes were established. It is entirely possible that tenure considerations were an important element in the decision-making process, but that the deliberations and justifications for decisions are recorded in grey literature, project reports, other records, or not at all, rather than being systematically analyzed in the academic literature.

This leaves a gap in our understanding that is particularly relevant in the case of Indonesia where tenure issues are so salient. And if we shift our focus to exploring the potential of PES for coastal and marine environments, the gap becomes even more significant. Property rights in coastal and marine ecosystems, which are frequently comprised of wetland environments, are often contested. As Adger and Luttrell (2000, p. 76) explain,

> “many wetlands areas lack a long history of ownership, clear tenure rights or any official delineation of property rights. Furthermore, traditional land rights are frequently not recognized […] Often lack of adaptation leads to a situation with great potential for conflict due to the overlapping property regimes between opposing interest groups [at different levels].”

Dealing with tenure issues within the scope of conceptualizing PES schemes in such environments is likely to be even more challenging that it is in terrestrial areas.

Concluding remark

The review of PES experiences in Indonesian watershed contexts presented in this Working Paper is an early preliminary output of our recently initiated research on new instruments in Indonesian coastal and watershed governance. Following this largely desk-based analysis, we are planning to conduct field research in selected Indonesian watersheds were PES schemes have been or are currently operational or envisaged. This research aims at contributing to a better understanding of the evolution and functioning of new governance instruments in the context of Indonesian watershed and coastal governance.

Acknowledgements

This research within Subproject 8 *Upstream-downstream linkages and new instruments in coastal and watershed governance* in the frame of the Indonesian-German research program SPICE III (*Science for the Protection of Indonesian Coastal Marine Ecosystems*) has been sponsored by the German Federal Ministry of Education and Research (BMBF), grant number 03F0644B. We are grateful to all research participants who supported our first exploratory research in Java, Indonesia in October 2012.

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